STORMWATER RUNOFF QUALITY CONTROL IN GREEN HIGHWAY PROJECTS

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DEDICATION

To my beloved son

Ephraim Denison Yaovi BIGAH

To my lovely heart

Nathalie DONOUVOSSI

To the only friend I ever trust

Dany Xolali AYITE

To my beloved parents

Suzane Afiwa AKODA & Apollinaire Komlan BIGAH

To my brothers and sisters

And to all the project group partners

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May God bless all of us!

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ABSTRACT

Stormwater runoff quality (SWRQ) within a city is influenced by the dual effect of the hydromodification and the pollutant loadings. Highway and road corridors increase impervious surfaces and generate several pollutants which contributory affect SWRQ. The aim of this study is to investigate sustainable highway features in order to protect SWRQ. Specifically, the study identifies green/sustainable highway requirements in terms of criteria and sub-criteria which are weighted and Best Management Practices (BMPs) capable of achieving better control of SWRQ. Discussion with experts in highway development, water resources management, and sustainable development have allowed the study to formulate the theoretical framework of the research and a questionnaire was administrated to professionals in those disciplines to provide their level of agreement using five-level Likert scale rating system. The average index and the factors analysis methods are used to assess and weight the importance of criteria and sub-criteria using the Statistical Package of Social Sciences (SPSS) tool. The study identifies three main criteria, Instrumentation and Monitoring Runoff Quality, Storm Runoff Treatment, and Pollution Reduction Practices for SWRQ control. Those criteria scored an average of 30% of water and environment protection. The most significant sub-criteria are Instrumentation to monitor and analyze pollutants, Ensure entire waste water treatment, and use structural BMPs to treat 90 percentile of annual rain fall. Furthermore, the study reveals that a combination of non structural and structural BMPs has to be adopted to exert better control over SWRQ. Most significant BMPs are Vegetation and Landscaping using native ground cover, Runoff Quality/Peak Rate BMPs, and Minimization of land disturbance by fitting the project into the site.

Keywords: *Green Highway, Stormwater runoff Quality, water resources protection, Best Management Practices*

ABSTRAK

Air Ribut Larian Berkualiti (ARLB) dalam bandar dipengaruhi oleh kesan dwi hydromodification dan beban pencemar. Koridor lebuh raya dan jalan raya meningkatkan permukaan kedap dan menjana beberapa pencemar yang penyumbang menjejaskan ARLB. Tujuan kajian ini adalah untuk menyiasat ciri-ciri lebuhraya mampan untuk melindungi ARLB. Khususnya, kajian mengenal pasti keperluan lebuh raya hijau atau bertahan dari segi kriteria dan sub-kriteria yang wajaran dan Pengurusan Amalan Terbaik (PAT) mampu mencapai kawalan yang lebih baik daripada ARLB. Perbincangan dengan pakar dalam pembangunan lebuh raya, pengurusan sumber air, dan pembangunan mampan telah dibenarkan kajian untuk merumuskan kerangka teori kajian dan soal selidik telah diedarkan kepada profesional dalam mereka disiplin untuk menyediakan tahap mereka perjanjian yang menggunakan skala Likert lima peringkat sistem penarafan . Indeks purata dan kaedah analisis faktor digunakan untuk menilai dan berat kepentingan kriteria dan sub-kriteria menggunakan Pakej Statistik Sains Sosial alat. Kajian ini mengenal pasti tiga utama kriteria, Instrumentasi dan Pemantauan Kualiti Larian, Ribut Rawatan Larian, dan Amalan Pengurangan Pencemaran untuk kawalan ARLB. Mereka kriteria menjaringkan purata 30% perlindungan air dan alam sekitar. Yang paling ketara sub-kriteria Instrumentasi untuk memantau dan menganalisis bahan pencemar, Pastikan rawatan air sisa keseluruhan, dan menggunakan PAT struktur untuk merawat 90 persentil kejatuhan hujan tahunan. Tambahan pula, kajian mendedahkan bahawa gabungan PAT struktur dan bukan struktur untuk diguna pakai untuk mengenakan kawalan yang lebih baik ke atas ARLB. PAT paling penting adalah Tumbuhan dan Lanskap menggunakan penutup bumi asli, PAT Larian Kadar Kualiti atau Puncak, dan Mengurangkan gangguan tanah dengan pemasangan projek ke dalam laman web.

Keywords: *Lebuhraya Hijau, larian Air Ribut Kualiti, perlindungan sumber air, Amalan Pengurusan Terbaik.*